A high purity germanium (HPGe) detector is used to measure the absolute activity of ^{226}Ra with online controlling of radon emanation (by measuring the ^{214}Bi activity, progeny of ^{226}Ra) to produce the released absolute activity of ^{222}Rn. This prototype of a calibration system was tested using AlphaGUARD (PQ2000Pro) monitor in opened and closed system with different ^{226}Ra source. Using the developed radon standard system, the calibration of radon measurement devices is considerably simplified and the measurement accuracy is improved [1].

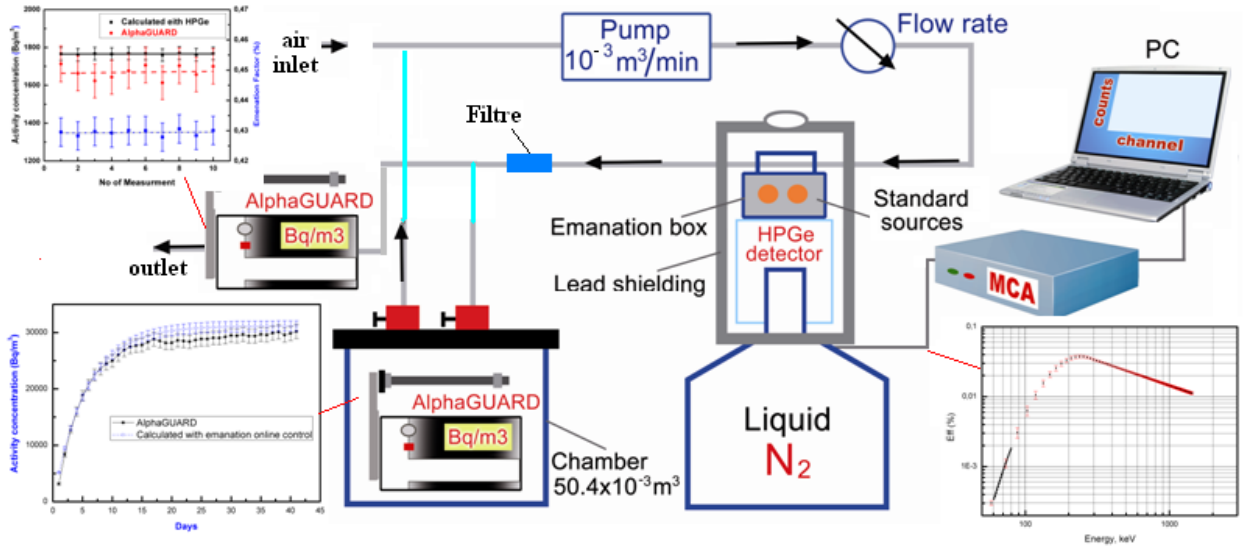

Fig. 1. Schematic of the experimental arrangement for open and close system for radon concentration standard.

1. Mostafa, Y. A., M. Vasyanovich, M., Zhukovsky, M. Appl. Radiat. Isot. 107, 109-112 (2016)

PHASE TRANSITIONS IN SILICON FROM 16 GPa UP TO 50 GPa

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Silicon has been studied under high pressure for a long time, his phase diagram is built up to 230 GPa and there are about 12 high pressure phases. But still remains question about lattice structure under range of compression from 30 GPa to 40 GPa. For example, Yuri B. Zaporozhets and You-Xiang Zhao emphasize only one phase transition at 40 GPa, which coincides transition from hexagonal lattice (Si—IV) to close-packed hexagonal lattice (Si—VII). Existence of the hexagonal transition up to 34 GPa is indicated by Qingyang Fan [1] and H. Olijnyk [2]. And still lives uncertain area Si—VII at 40 GPa, which afterwards were identified as Si—VI. Nowadays sci-

entists are trying to find boundary of the existence of Si—IV and determine phase structure of Si -VI.

In this Letter we investigated Silicon electrical resistance under pressures from 16 GPa to 50 GPa to examine boundaries of possible transition in range from 32 GPa to 35 GPa. Hyperbaric chamber with «rounded cone—flat» anvils, made from «Carbonado», was used to generate pressure. These anvils are a good conductors and high-pressure cell allow to measure the electrical resistance of the sample.

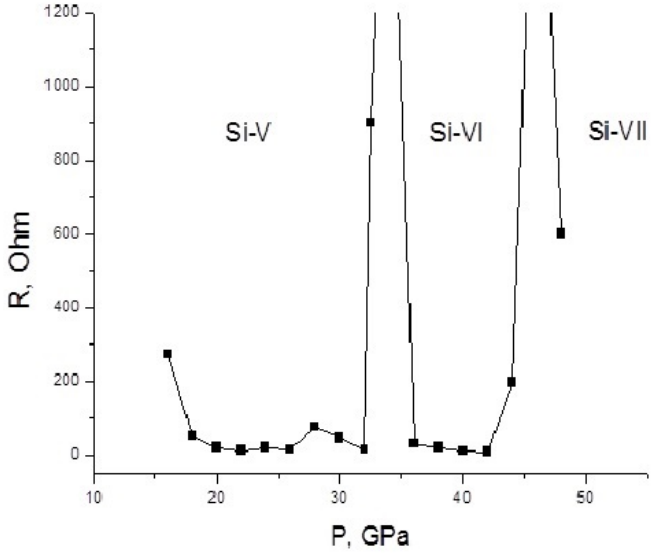

Fig. 1. Dependence relaxation time of the electrical resistance to pressure

During the experiment was received dependence of electrical resistance under fixed pressure to time. The graph (add. 1a) is approximated by an exponential dependence. As a result of approximation time relaxations were determined for each pressure measurement. According to changes we can find out about possible phase transition. If time dependence can not be described as exponent and represents random beats (add. 1b), or relaxation time increases sharply, we can conclude that applied pressure causes structural changes in the sample.

Dependence time relaxation to pressure is shown on Fig. 1. Based on this graph we assume that between 36 GPa and 40 GPa endures an area with small relaxation time, which indicates the existence of stable crystalline structure. Peaks indicate boundaries of the presence of the crystal structure at 34 and 44 GPa. Moreover, the completion of a phase transition at 16 GPa to simple hexagonal lattice in initial range of the figure. Received data coincide with phase diagrams, which are described in contemporary researchers [1,3].

1. Qingyang Fan, Changchun Chai, Qun Wei, Journal of Solid State Chemistry, 233, 471 (2015).
2. H. Olijnyk, S.K. Sikka, W.B. Holzapfel, J. Physics Letters, 103A, № 3, 137 (1983).
3. Ichiro Hatta, Masato Shibuya, Journal of the physical society of Japan, 45, № 2, 487 (1978).